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OCCURRENCE OF *YERSINIA SPECIES* IN RAW AND PASTEURIZED MILK IN DAKAHLIA GOVERNORATE
(With 3 Tables)

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تواجد ميكروبات اليارسينيا في اللبن الخام والمبستر بمحافظة الدقهلية

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أجريت الدراسة علي ٢٠٠ عينة من اللبن الخام واللبن المبستر (١٠٠ لكل نوع)، تم جمعها من مصادر مختلفة بمحافظة الدقهلية - مصر وذلك لفحصها بكتريولوجيا لمعرفة مدى تلوثها بميكروبات اليارسينيا. وقد أوضحت النتائج تواجد ميكروبات اليارسينيا في اللبن الخام بنسبة ١٤%، بينما لم تعزل من اللبن المبستر، كما تم عزل ميكروبات اليارسينيا انثيروكوليتكا، اليارسينيا فريديكسينيا، اليارسينيا سيدوتوبيركلوزس، اليارسينيا انترميديا واليارسينيا كريستنسنا بنسبة ٨%، ٤%، ٢%، ٢%، ٢% علي التوالي من عينات اللبن الخام التي تم جمعها. ولقد تم دراسة مدى ضراوة ميكروبات اليارسينيا انثيروكوليتكا المعزولة ولقد كانت نسبة ضراوة الميكروبات المعزولة تمثل ٢٥%. هذا وقد تمت مناقشة الأهمية الصحية للميكروبات المعزولة وكذلك الإقتراحات الواجب اتباعها لتحسين جودة اللبن ومنتجاته وللحفاظ علي صحة المستهلك.

SUMMARY

Two hundred random samples of market raw and pasteurized milk (100 of each) were collected from different localities at Dakahlia Governorate, (Egypt) and examined bacteriologically for the presence of *Yersinia* organisms. The results revealed that *Yersinia spp.* were detected in 14% of examined market raw milk samples, while they were not recovered from pasteurized milk samples. *Yersinia enterocolitica* (8%) was the most common strain isolated from examined market raw milk samples followed by *Y. frederiksenii* (4%), *Y. pseudotuberculosis* (2%), *Y. intermedia* (2%) and *Y. kristensenii* (2%). Only 2 (25%) out of 8 isolated strains of *Y. enterocolitica* were virulent. The public health

importance of *Yersinia spp.* and the suggestive control measures for improving the quality and safety market milk were discussed.

Key Words: *Yersinia, Milk, Pasteurized milk*

INTRODUCTION

Yersinia organisms are Gram-negative, psychotrophic milk-borne enteric pathogens. These organisms are widespread in the environment and are indigenous to the gastrointestinal tracts of warm-blooded animals including dairy cattle (Marshall, 1992).

Yersinia spp. can enter the milk from faeces, bedding and improperly cleaned teats and milk handling equipments contaminated with soil or water (Robinson, 1990).

Several outbreaks of food poisoning caused by *Yersinia enterocolitica* were associated with consumption of milk and its products (Eley, 1996). Consumption of raw milk causes a high risk of infection by milk-borne pathogens as *Yersinia enterocolitica*, *Salmonella*, *Campylobacter*, *Escherichia coli* O₁₅₇:H₇, *Listeria monocytogenes* and *Streptococcus* (group A and C).

Furthermore, several outbreaks of *Yersinia* have been associated with consumption of pasteurized milk (Varnam and Evans, 1991 and Ackers *et al.*, 2000).

Therefore, this study was planned to throw the light on the occurrence of *Yersinia species* in market raw and pasteurized milk in Dakahlia Governorate, (Egypt).

MATERIAL and METHODS

Two hundred random samples of market raw and pasteurized milk (100 of each) were collected from different supermarkets and dairy shops in Dakahlia Governorate, during spring of 2003.

The collected samples were transferred to the laboratory in insulated ice box with a minimum of delay to be examined bacteriologically for the presence of *Yersinia species*.

Isolation and identification of *Yersinia species*:

Twenty-five ml of milk sample were added to 225 ml of tris buffered peptone water and incubated at 4°C for three weeks.

One ml of the incubated broth was added to 9 ml of 0.5% potassium hydroxide/ 0.5 sodium chloride solution and mixed. After 15 – 30

seconds a loopful of the mixture was streaked on Cefsulodin Irgasan Novobiocin (CIN) agar, CIN plates were incubated at 30°C for 24h. Characteristic colonies (deep red center with a sharp and translucent outer zone) of *Yersinia* organisms were purified and identified biochemically according to the methods recommended by Krieg and Hlot (1984) and Roberts *et al.*, (1995).

Pathogenicity test:

The virulence of all isolates confirmed as *Yersinia enterocolitica* were detected according to the techniques recommended by Schiemann, (1981) and A.O.C.A. (1984).

RESULTS

Table 1: Prevalence of *Yersinia species* in the examined market milk samples.

Samples	Number of samples	Positive samples	
		No.	%
Raw milk	100	14	14.0
Pasteurized milk	100	0	0.0

Table 2: Frequency distribution of *Yersinia species* isolated from market raw milk samples.

Yersinia species	No. of sample	%
<i>Y. enterocolitica</i>	8	8.0
<i>Y. frederiksenii</i>	4	4.0
<i>Y. pseudotuberculosis</i>	2	2.0
<i>Y. intermedia</i>	2	2.0
<i>Y. kristensenii</i>	2	2.0

Table 3: Virulence of *Yersinia enterocolitica* strains isolated from the examined market raw milk samples.

No. of isolates	Virulence strains		Δ virulence strains	
	No.	%	No.	%
8	2	25.0	6	75.0

DISCUSSION

Results reported in Table (1) reveal that 14 (14.0%) out of 100 market raw milk samples were contaminated with *Yersinia* species.

Nearly similar results were obtained by El-Prince and Sabreen, (1998). Comparatively higher incidences were reported by Desmasure *et al.*, (1997) and Ebrahim, (1998), while lower incidence were detected by Hamama *et al.*, (1992); Khalil *et al.*, (1993); Jamshidian and Babakhani, (1999) and Uraz and Yucel, (1999). On the contrary, El-Leboudy, (1989) failed to detect *Yersinia* organisms in Egyptian raw milk.

Concerning of pasteurized milk, *Yersinia* organisms failed to be detected in examined pasteurized milk samples (Table 1).

These results agreed with those reported by Mansour *et al.*, (1999) and disagreed with Moustafa *et al.*, (1983); Tassinari *et al.*, (1994); Bruce *et al.*, (1995); Jamshidian and Babakhani, (1999) and Romia, (2001).

The presence of *Yersinia spp.* in milk and its products was indicative of poor hygiene or cross contamination (Roberts *et al.*, 1995).

Table (2) shows that *Yersinia enterocolitica*, *Y. frederiksenii*, *Y. pseudotuberculosis*, *Y. intermedia* and *Y. kristensenii* could be isolated from 8%, 4%, 2%, 2% and 2% of examined market raw milk samples respectively.

Similar results were reported by Hamama *et al.*, (1992); Kuznetsov and Bagryantsev, (1992); Rea *et al.*, (1992) and Romia, (2001).

The pathogenicity of isolated strains of *Yersinia enterocolitica* in this study revealed that 2 (25%) out of 8 strains were virulent (Table 3).

These results agreed with those reported by Abdel-Hady (1993) and El-Prince and Sabreen (1998) and disagreed with Pritchard *et al.*, (1995).

Pathogenic strains of *Yersinia enterocolitica* are capable of causing illness in humans with wide range of symptoms. In children and adolescents, symptoms of gastroenteritis, mesenteric lymphadenitis and pseudoappendicitis are predominant, where in adults, symptoms of acute abdominal disorders and arthritis (Larsen, 1980; Roberts *et al.*, 1995 and Marth and Steele, 2001).

Yersinia enterocolitica and *Y. frederiksenii* were isolated from patients suffered from Yersiniosis (Forsythe and Hayes, 1998). Furthermore, *Yersinia enterocolitica* and *Y. pseudotuberculosis* have been responsible for cases of food poisoning outbreaks (Eley, 1996).

In conclusion, strict hygienic measures during milk production, adequate heat treatment of raw milk, legislation prohibiting the sale of unpasteurized milk and HACCP systems must be applied to improve the quality of raw milk and to safeguard the consumers.

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